＝共催＝
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Monte Carlo modeling and in-vivo imaging in ion beam therapy

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＝Abstract＝

The favourable physical selectivity of ion beams may enable superior tumour-dose conformality with better sparing of surrounding critical organs and healthy tissue with respect to external radiotherapy modalities based on conventional electromagnetic radiation. Full clinical exploitation of the advantages of ions demands accurate characterization and modelling of the beam and its interaction in tissue for a reliable description of absorbed and RBE (relative-biological-effectiveness)-weighted dose. Moreover, tools for in-vivo validation of the actually delivered treatment during the fractionated course of radiation therapy would be highly beneficial.

This talk will review the initial experience in the application of Monte Carlo methods and PET (positron emission tomography)-based verification to scanned proton and carbon ion therapy at the Heidelberg Ion Beam Therapy Center. Moreover, it will describe investigations being carried out in Munich and Heidelberg with the goal to improve the quality of treatment planning and to explore the potential of additional imaging methods which could complement PET monitoring. In particular, research is ongoing to address the role of new ion species and new ion acceleration concepts, as well as to investigate the potential of new means of in-vivo visualization of the beam from nuclear reaction products or direct ionization processes.

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